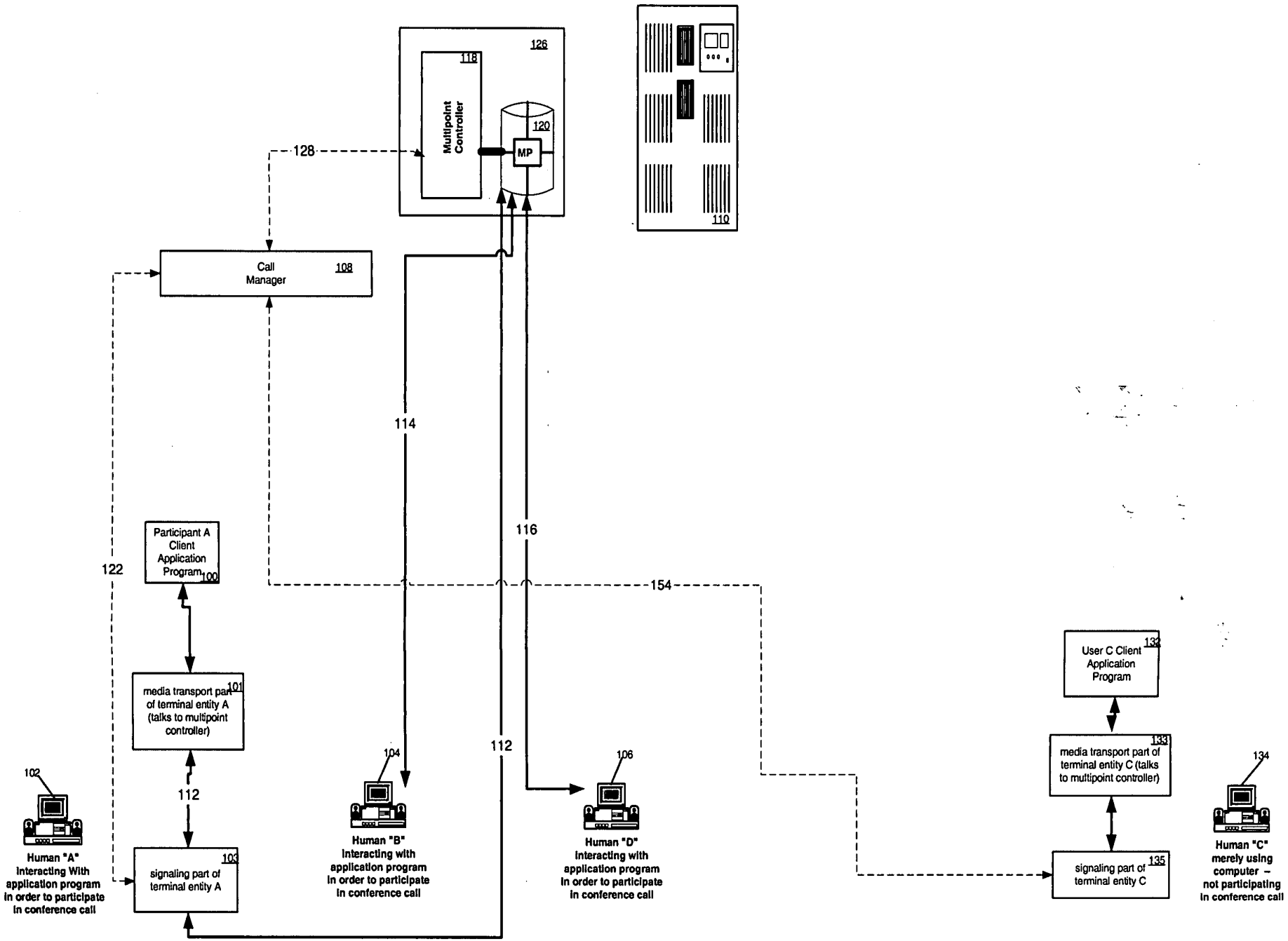


Figure 1 – Related Art

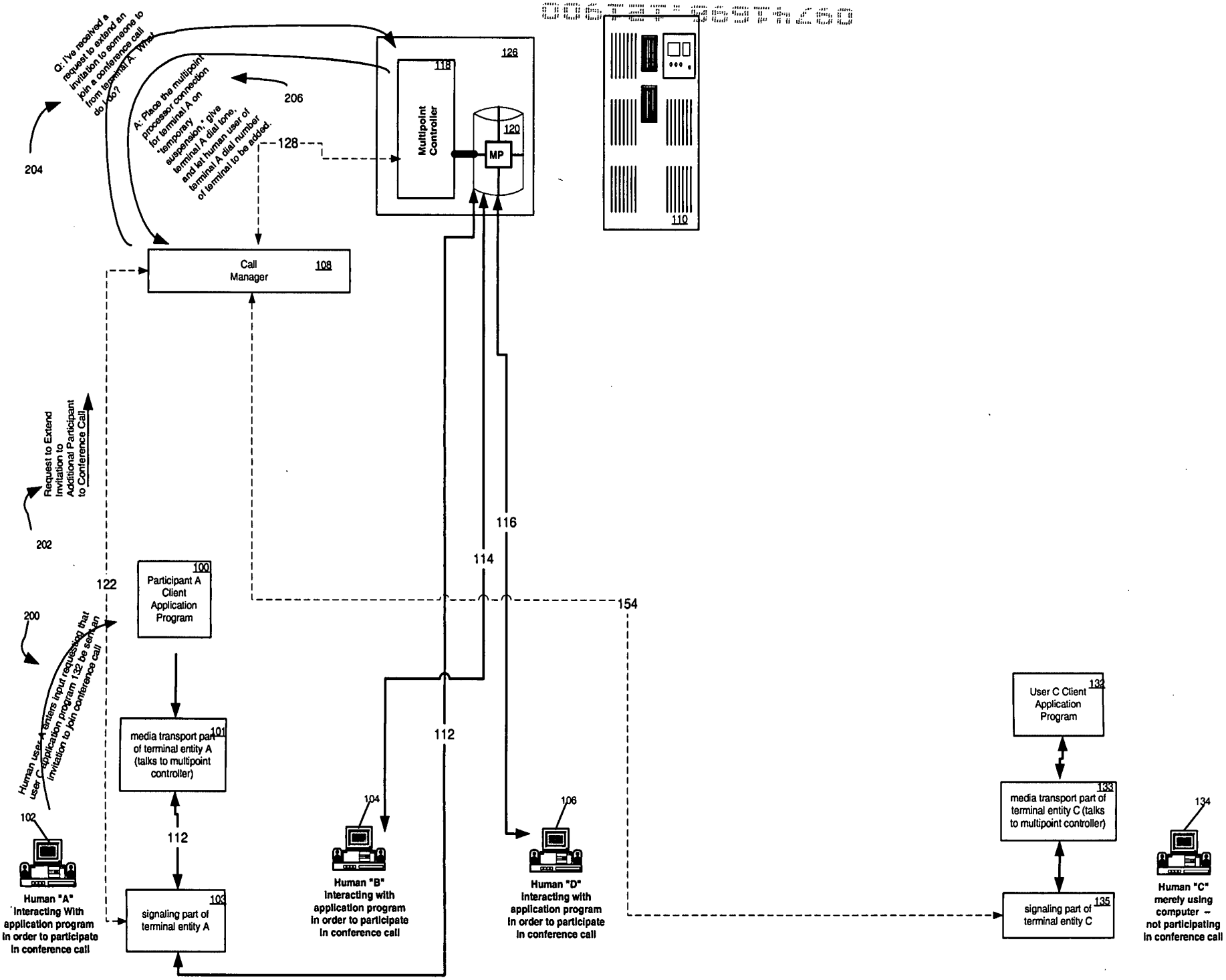


Figure 2 -- Related Art

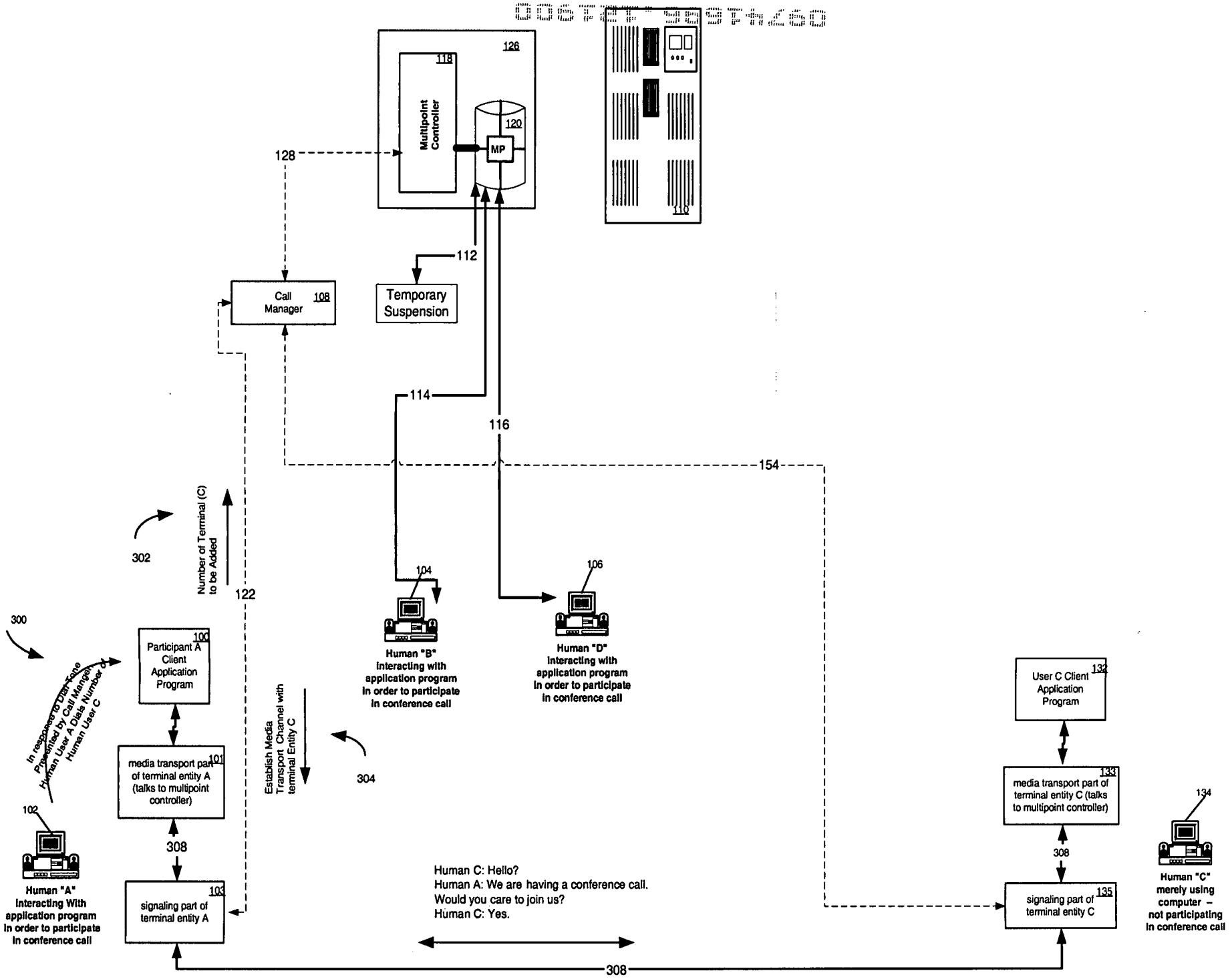


Figure 3 - Related Art

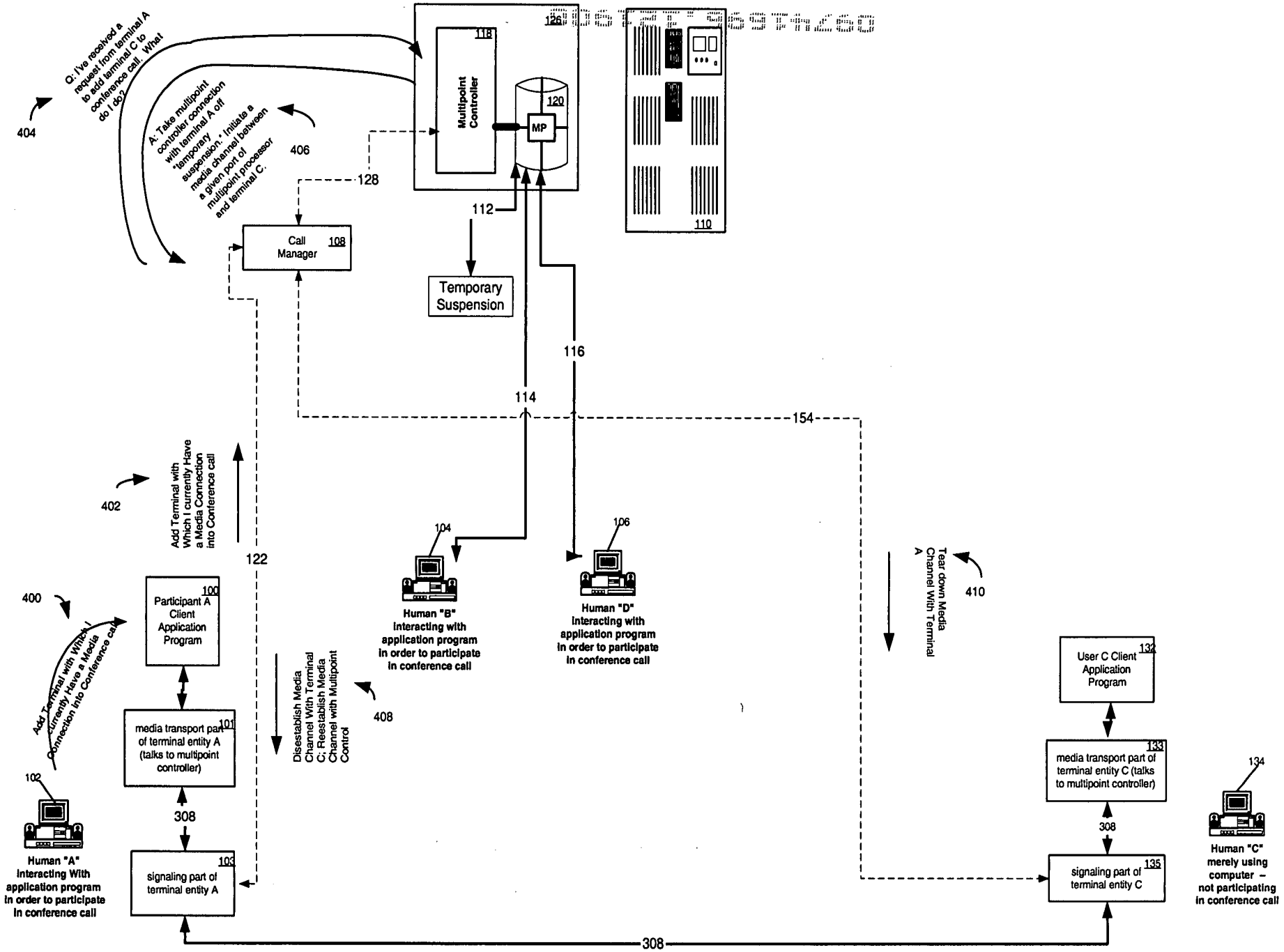


Figure 4 – Related Art

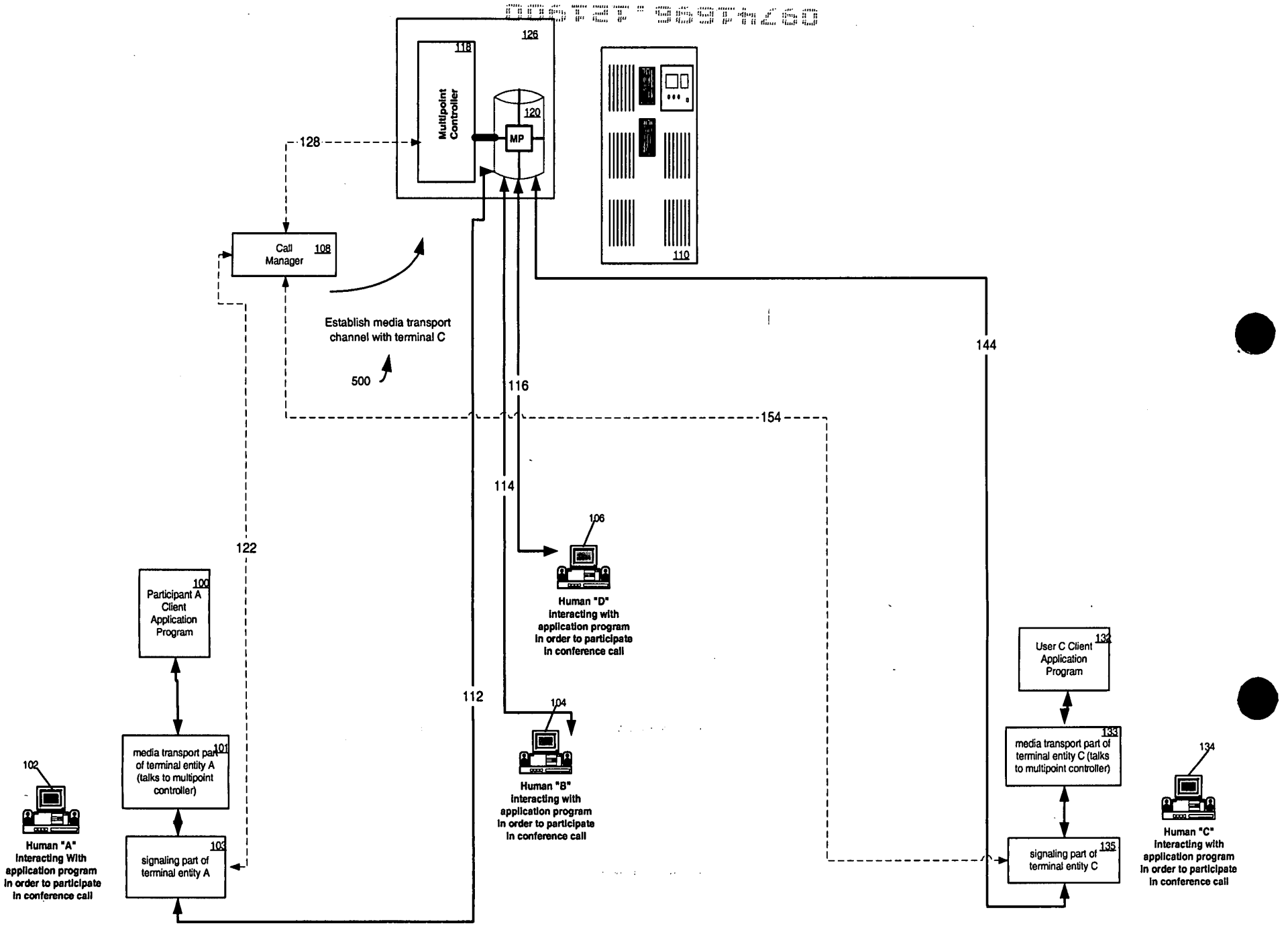


Figure 5 - Related Art

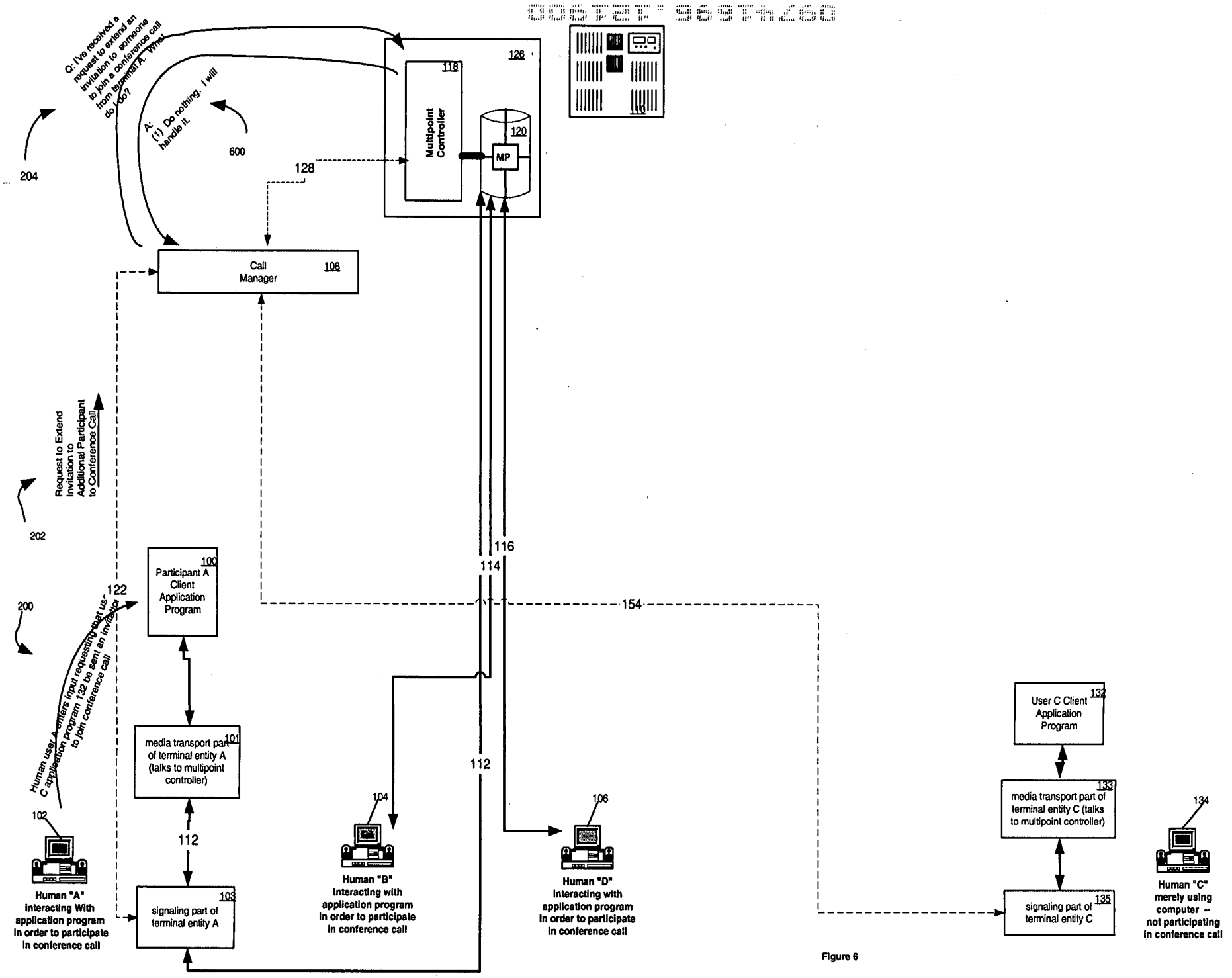
Q: I've received a request to extend an invitation to someone to join a conference call from terminal A. What do I do?
A: (1) Do nothing. I will handle it.
600
204
126
118
Multipoint Controller
120
MP
128
Call Manager
108
Request to Extend Invitation to Additional Participant to Conference Call
202
116
114
154
122
200
Participant A Client Application Program
100
Human user A enters input requesting that user C application program 122 be sent an invitation to join conference call
media transport part of terminal entity A (talks to multipoint controller)
101
112
102
Human "A" interacting With application program in order to participate in conference call
signaling part of terminal entity A
103
104
Human "B" interacting with application program in order to participate in conference call
106
Human "D" interacting with application program in order to participate in conference call
User C Client Application Program
132
media transport part of terminal entity C (talks to multipoint controller)
133
signaling part of terminal entity C
135
134
Human "C" merely using computer – not participating in conference call

Figure 6

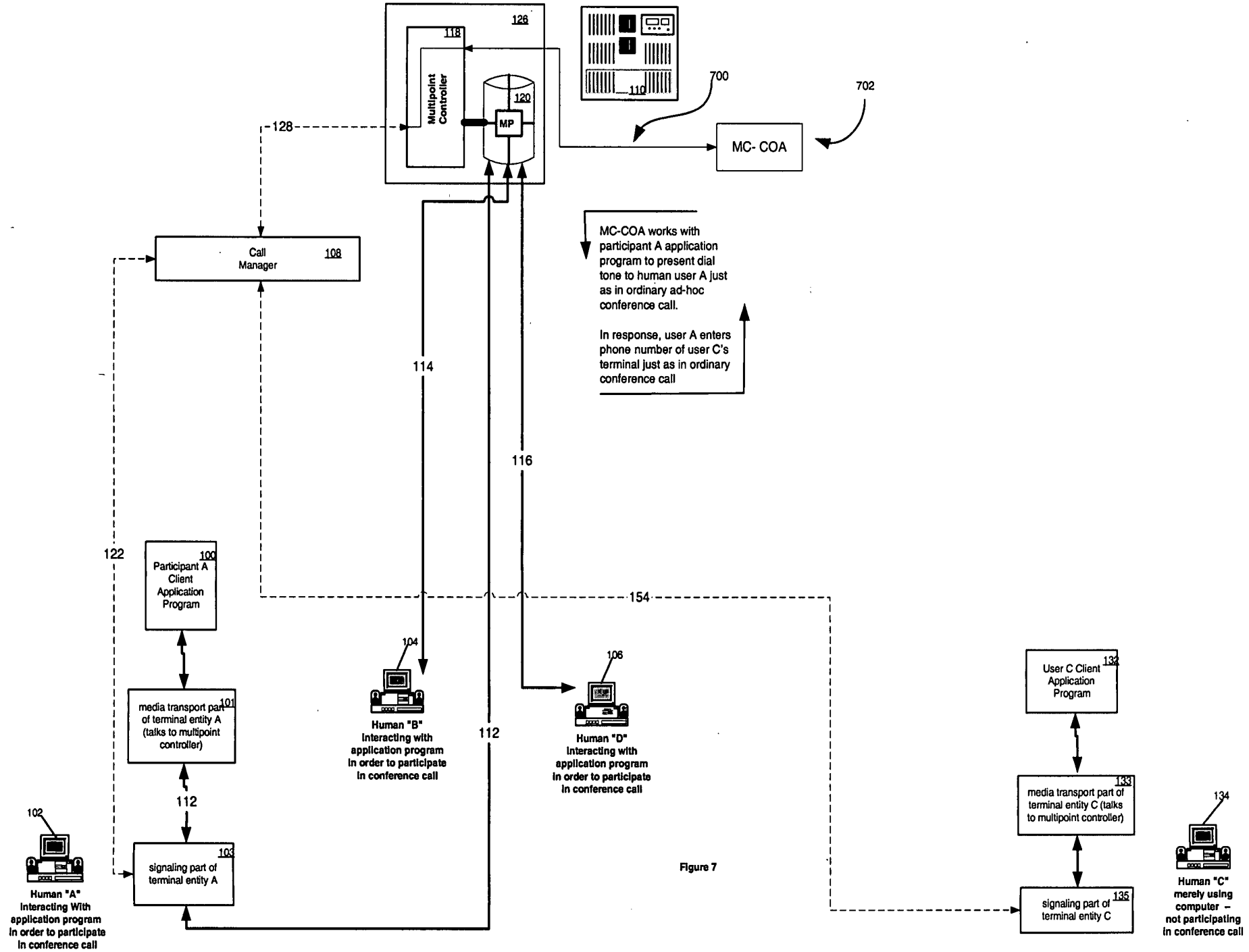
126
118
Multipoint Controller
120
MP
110
700
702
MC- COA
128
Call Manager
108
MC-COA works with participant A application program to present dial tone to human user A just as in ordinary ad-hoc conference call.
In response, user A enters phone number of user C's terminal just as in ordinary conference call
114
116
122
Participant A Client Application Program
100
154
media transport part of terminal entity A (talks to multipoint controller)
101
112
signaling part of terminal entity A
103
102
Human "A" interacting With application program in order to participate in conference call
104
Human "B" interacting with application program in order to participate in conference call
106
Human "D" interacting with application program in order to participate in conference call
User C Client Application Program
132
media transport part of terminal entity C (talks to multipoint controller)
133
signaling part of terminal entity C
135
134
Human "C" merely using computer – not participating in conference call

Figure 7

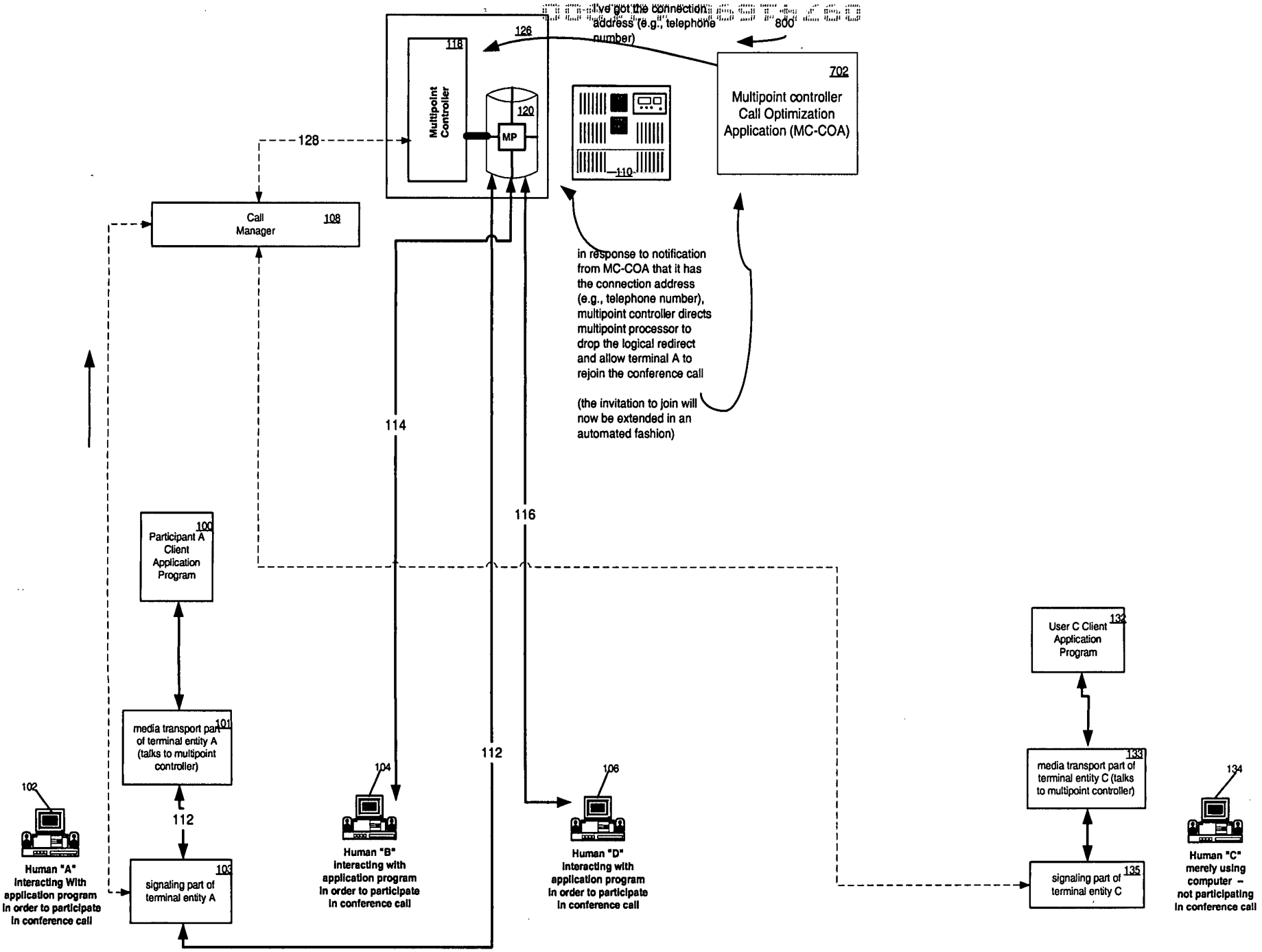
I've got the connection address (e.g., telephone number)
800
126
118
Multipoint Controller
120
MP
110
702
Multipoint controller Call Optimization Application (MC-COA)
128
Call Manager
108
in response to notification from MC-COA that it has the connection address (e.g., telephone number), multipoint controller directs multipoint processor to drop the logical redirect and allow terminal A to rejoin the conference call
(the invitation to join will now be extended in an automated fashion)
114
116
112
Participant A Client Application Program
100
media transport part of terminal entity A (talks to multipoint controller)
101
112
102
Human "A" interacting With application program In order to participate In conference call
signaling part of terminal entity A
103
104
Human "B" interacting with application program In order to participate In conference call
106
Human "D" interacting with application program In order to participate In conference call
User C Client Application Program
132
media transport part of terminal entity C (talks to multipoint controller)
133
signaling part of terminal entity C
135
134
Human "C" merely using computer – not participating In conference call

Figure 8

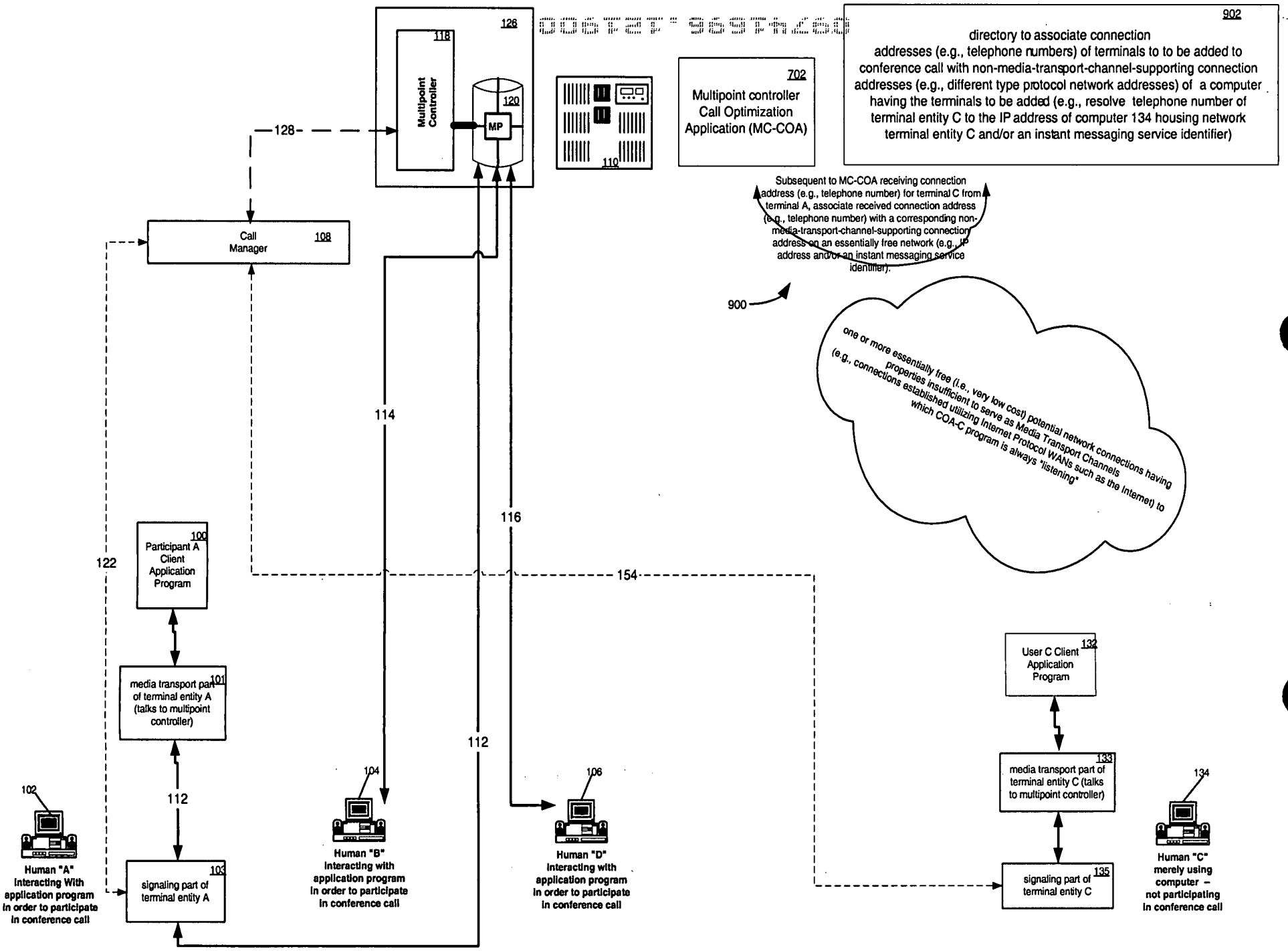
126
118
Multipoint Controller
120
MP
110
128
Call Manager 108
114
116
112
112
122
154
100
Participant A Client Application Program
media transport part of terminal entity A (talks to multipoint controller) 101
signaling part of terminal entity A 103
102
Human "A" interacting With application program In order to participate in conference call
104
Human "B" interacting with application program In order to participate in conference call
106
Human "D" interacting with application program In order to participate in conference call
User C Client Application Program 132
media transport part of terminal entity C (talks to multipoint controller) 133
signaling part of terminal entity C 135
134
Human "C" merely using computer – not participating in conference call
702
Multipoint controller Call Optimization Application (MC-COA)
902
directory to associate connection addresses (e.g., telephone numbers) of terminals to to be added to conference call with non-media-transport-channel-supporting connection addresses (e.g., different type protocol network addresses) of a computer having the terminals to be added (e.g., resolve telephone number of terminal entity C to the IP address of computer 134 housing network terminal entity C and/or an instant messaging service identifier)
Subsequent to MC-COA receiving connection address (e.g., telephone number) for terminal C from terminal A, associate received connection address (e.g., telephone number) with a corresponding non-media-transport-channel-supporting connection address on an essentially free network (e.g., IP address and/or an instant messaging service identifier).
900
one or more essentially free (i.e., very low cost) potential network connections having properties insufficient to serve as Media Transport Channels (e.g., connections established utilizing Internet Protocol WANs such as the Internet) to which COA-C program is always "listening"

Figure 9

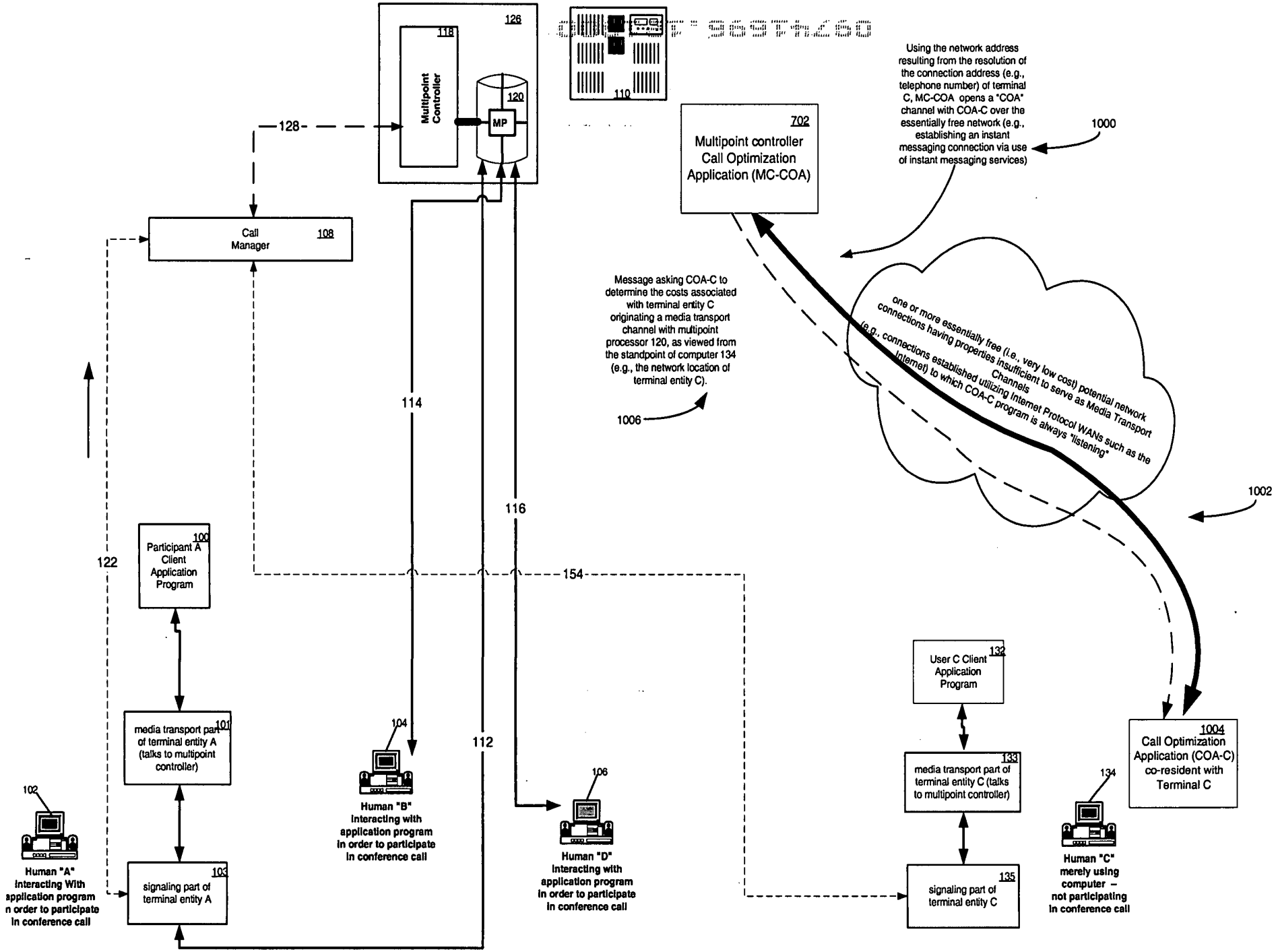
126
118
Multipoint Controller
120
MP
110
128
Call Manager 108
114
116
122
154
112
Participant A Client Application Program 100
media transport part of terminal entity A (talks to multipoint controller) 101
signaling part of terminal entity A 103
102
Human "A" interacting with application program in order to participate in conference call
104
Human "B" interacting with application program in order to participate in conference call
106
Human "D" interacting with application program in order to participate in conference call
Using the network address resulting from the resolution of the connection address (e.g., telephone number) of terminal C, MC-COA opens a "COA" channel with COA-C over the essentially free network (e.g., establishing an instant messaging connection via use of instant messaging services)
1000
702
Multipoint controller Call Optimization Application (MC-COA)
Message asking COA-C to determine the costs associated with terminal entity C originating a media transport channel with multipoint processor 120, as viewed from the standpoint of computer 134 (e.g., the network location of terminal entity C).
1006
one or more essentially free (i.e., very low cost) potential network connections having properties insufficient to serve as Media Transport Channels (e.g., connections established utilizing Internet Protocol WANs such as the Internet) to which COA-C program is always "listening"
1002
User C Client Application Program 132
media transport part of terminal entity C (talks to multipoint controller) 133
signaling part of terminal entity C 135
134
Human "C" merely using computer – not participating in conference call
1004
Call Optimization Application (COA-C) co-resident with Terminal C

Figure 10

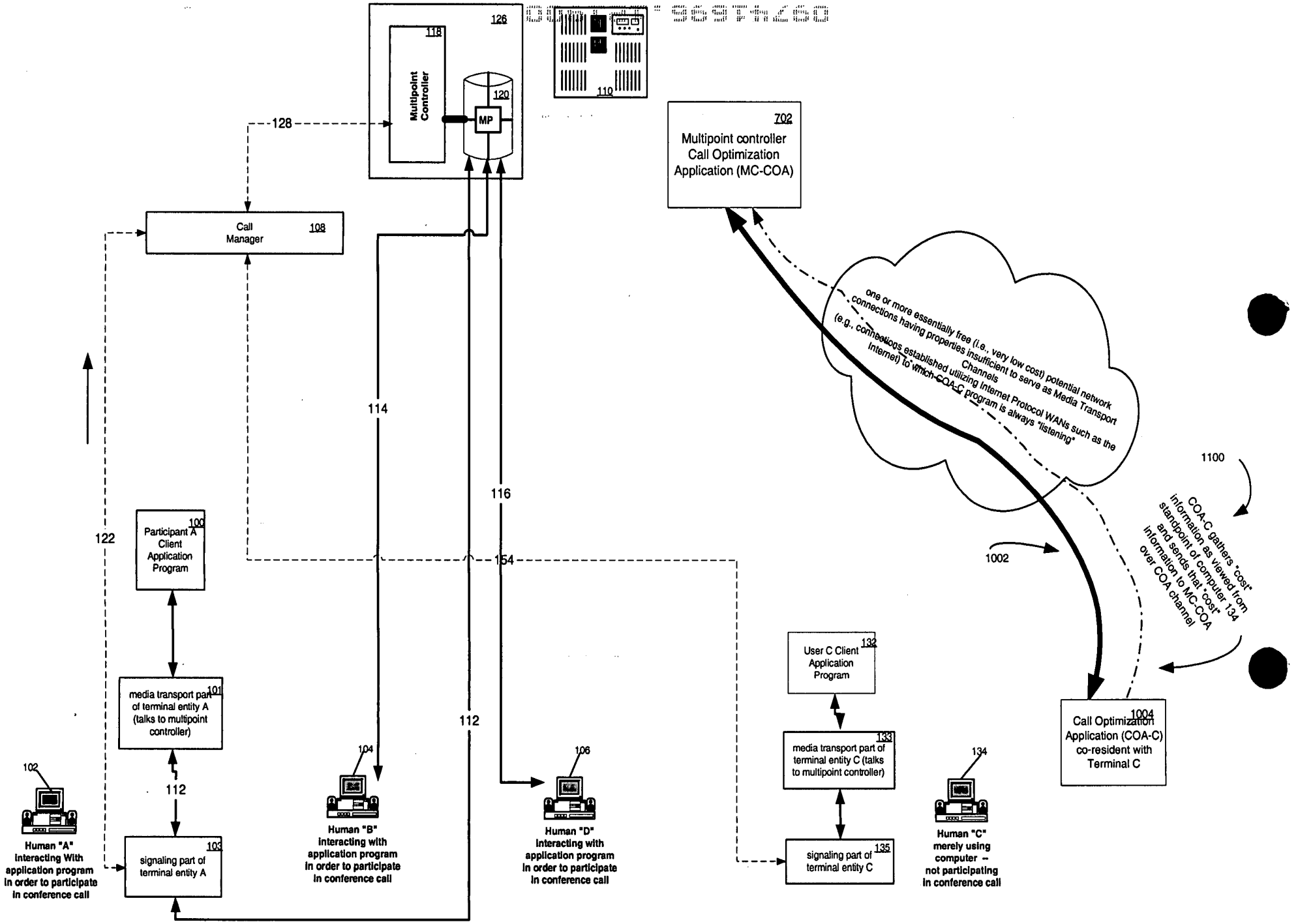
126
118
Multipoint Controller
120
MP
110
128
Call Manager
108
702
Multipoint controller Call Optimization Application (MC-COA)
one or more essentially free (i.e., very low cost) potential network connections having properties insufficient to serve as Media Transport Channels
(e.g., connections established utilizing Internet Protocol WANs such as the Internet) to which COA-C program is always "listening"
1100
COA-C gathers "cost" information as viewed from standpoint of computer 134 and sends that "cost" information to MC-COA over COA channel
1002
114
116
122
154
Participant A Client Application Program
100
media transport part of terminal entity A (talks to multipoint controller)
101
112
112
102
Human "A" interacting With application program In order to participate In conference call
signaling part of terminal entity A
103
104
Human "B" interacting with application program In order to participate In conference call
106
Human "D" interacting with application program In order to participate In conference call
User C Client Application Program
132
media transport part of terminal entity C (talks to multipoint controller)
133
signaling part of terminal entity C
135
134
Human "C" merely using computer -- not participating In conference call
Call Optimization Application (COA-C) co-resident with Terminal C
1004

Figure 11

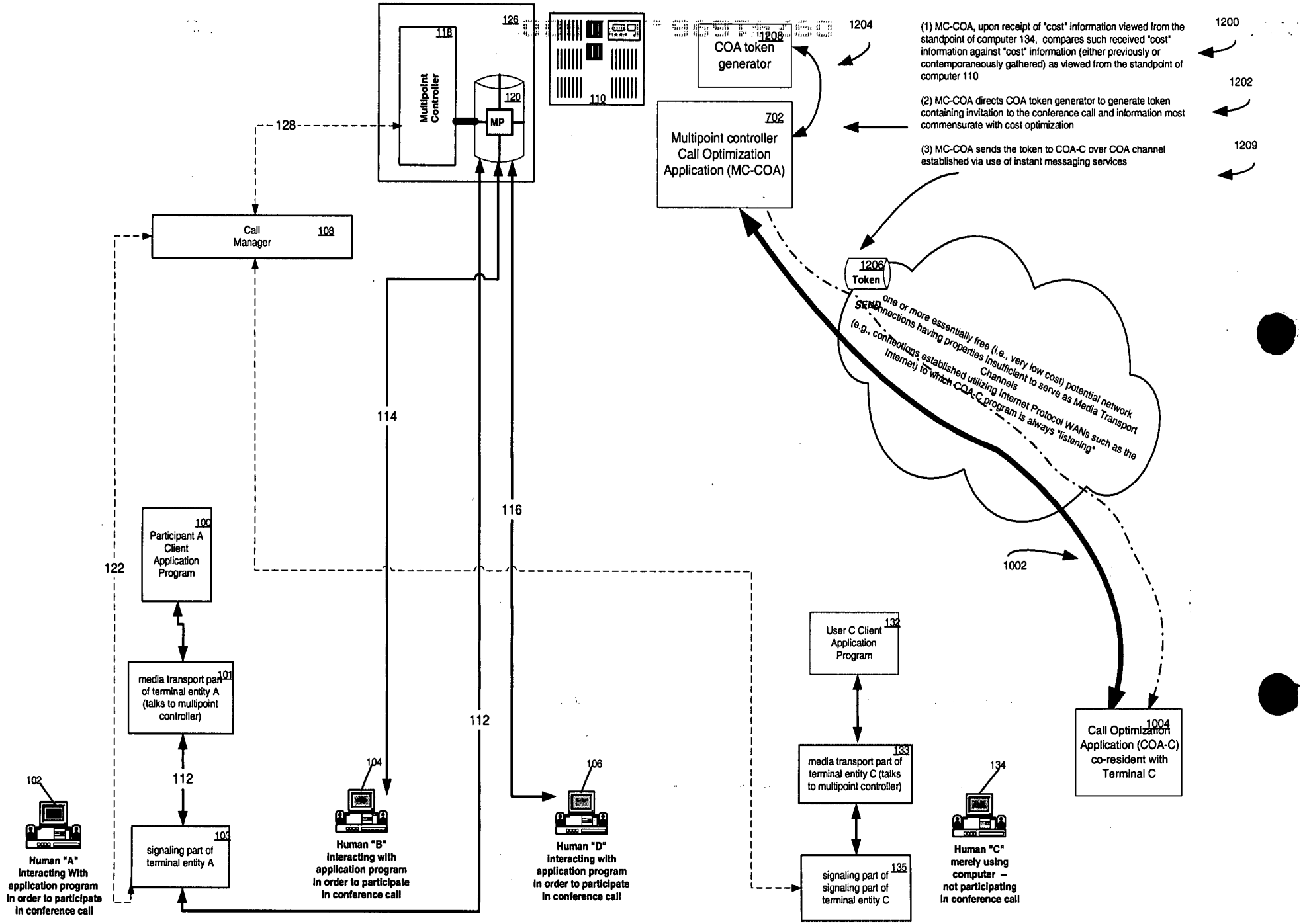
126
118
Multipoint Controller
120
MP
110
128
Call Manager
108
114
116
112
122
Participant A Client Application Program
100
media transport part of terminal entity A (talks to multipoint controller)
101
112
signaling part of terminal entity A
103
102
Human "A" interacting With application program in order to participate in conference call
104
Human "B" interacting with application program in order to participate in conference call
106
Human "D" interacting with application program in order to participate in conference call
1208
COA token generator
1204
Multipoint controller Call Optimization Application (MC-COA)
702
(1) MC-COA, upon receipt of "cost" information viewed from the standpoint of computer 134, compares such received "cost" information against "cost" information (either previously or contemporaneously gathered) as viewed from the standpoint of computer 110
1200
(2) MC-COA directs COA token generator to generate token containing invitation to the conference call and information most commensurate with cost optimization
1202
(3) MC-COA sends the token to COA-C over COA channel established via use of instant messaging services
1209
1206
Token
SEND
one or more essentially free (i.e., very low cost) potential network connections having properties insufficient to serve as Media Transport Channels (e.g., connections established utilizing Internet Protocol WANs such as the Internet) to which COA-C program is always "listening"
1002
User C Client Application Program
132
media transport part of terminal entity C (talks to multipoint controller)
133
signaling part of signaling part of terminal entity C
135
134
Human "C" merely using computer – not participating in conference call
Call Optimization Application (COA-C) co-resident with Terminal C
1004

Figure 12

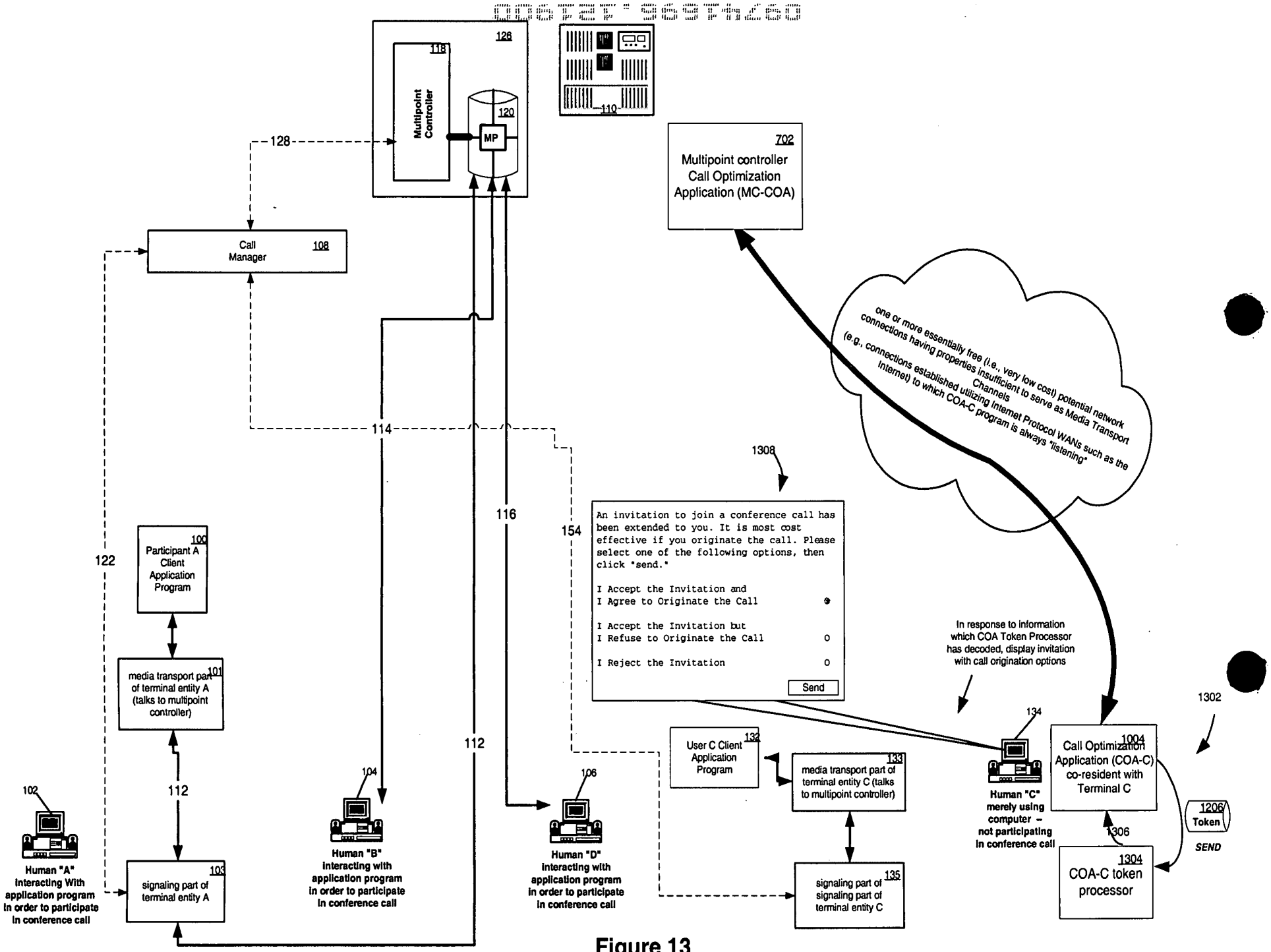
126
118
Multipoint Controller
120
MP
110
128
Call Manager
108
114
116
112
112
122
154
1308
An invitation to join a conference call has been extended to you. It is most cost effective if you originate the call. Please select one of the following options, then click "send."
I Accept the Invitation and I Agree to Originate the Call
I Accept the Invitation but I Refuse to Originate the Call
I Reject the Invitation
Send
702
Multipoint controller Call Optimization Application (MC-COA)
one or more essentially free (i.e., very low cost) potential network connections having properties insufficient to serve as Media Transport Channels (e.g., connections established utilizing Internet Protocol WANs such as the Internet) to which COA-C program is always "listening"
In response to information which COA Token Processor has decoded, display invitation with call origination options
100
Participant A Client Application Program
media transport part of terminal entity A (talks to multipoint controller)
101
signaling part of terminal entity A
103
102
Human "A" interacting With application program in order to participate in conference call
104
Human "B" interacting with application program in order to participate in conference call
106
Human "D" interacting with application program in order to participate in conference call
User C Client Application Program
132
media transport part of terminal entity C (talks to multipoint controller)
133
signaling part of signaling part of terminal entity C
135
134
Human "C" merely using computer – not participating in conference call
1302
Call Optimization Application (COA-C) co-resident with Terminal C
1004
1206
Token
SEND
1306
1304
COA-C token processor

Figure 13

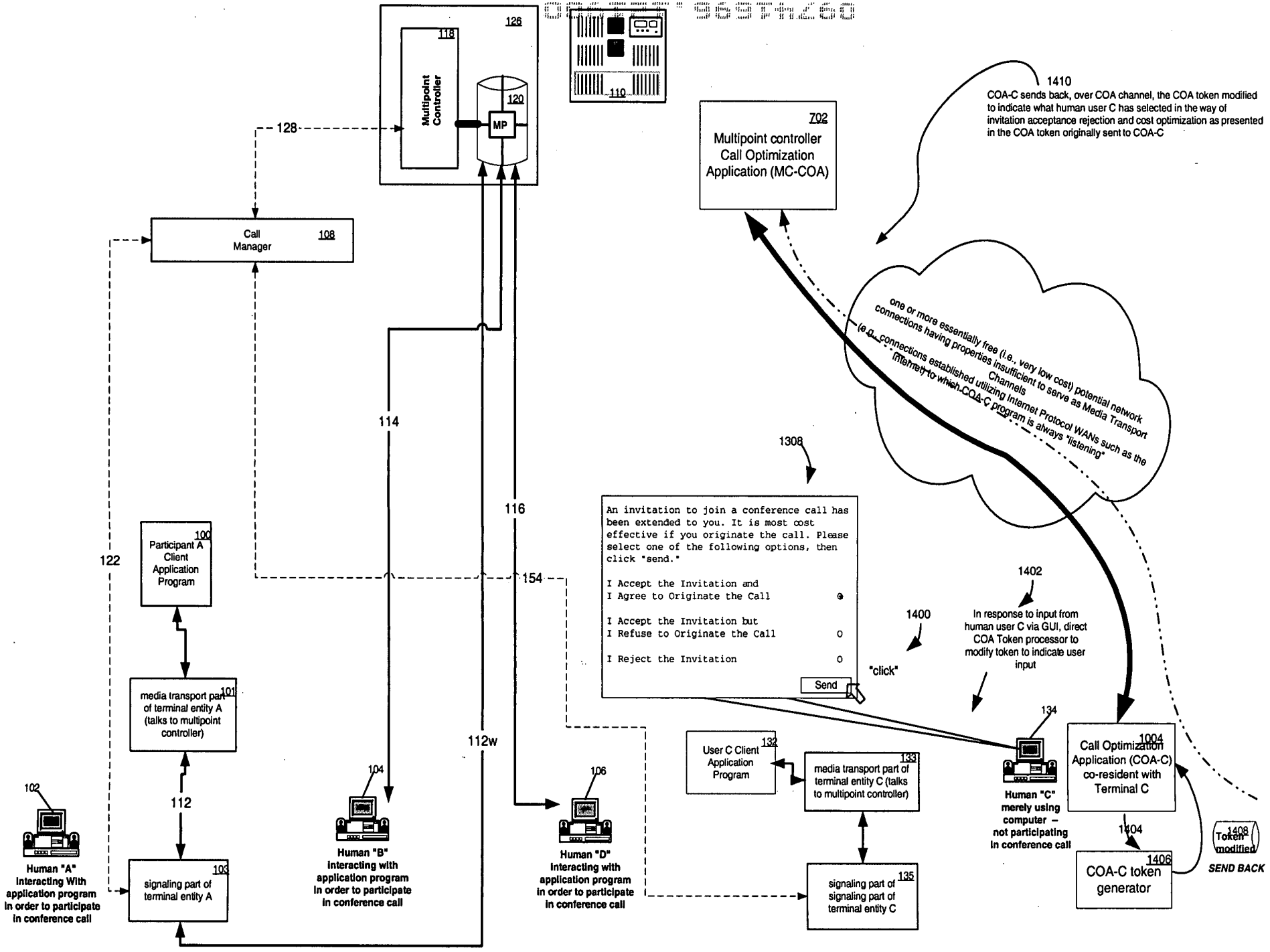
126
118
Multipoint Controller
120
MP
110
128
Call Manager
108
114
116
122
154
112w
112
Participant A Client Application Program
100
media transport part of terminal entity A (talks to multipoint controller)
101
signaling part of terminal entity A
103
102
Human "A" interacting With application program In order to participate in conference call
104
Human "B" interacting with application program In order to participate in conference call
106
Human "D" interacting with application program In order to participate in conference call
1410
COA-C sends back, over COA channel, the COA token modified to indicate what human user C has selected in the way of invitation acceptance rejection and cost optimization as presented in the COA token originally sent to COA-C
702
Multipoint controller Call Optimization Application (MC-COA)
one or more essentially free (i.e., very low cost) potential network connections having properties insufficient to serve as Media Transport Channels
(e.g., connections established utilizing Internet Protocol WANs such as the Internet to which COA-C program is always "listening"
1308
An invitation to join a conference call has been extended to you. It is most cost effective if you originate the call. Please select one of the following options, then click "send."
I Accept the Invitation and I Agree to Originate the Call
I Accept the Invitation but I Refuse to Originate the Call
I Reject the Invitation
Send
1400
"click"
1402
In response to input from human user C via GUI, direct COA Token processor to modify token to indicate user input
User C Client Application Program
132
media transport part of terminal entity C (talks to multipoint controller)
133
signaling part of signaling part of terminal entity C
135
134
Human "C" merely using computer – not participating In conference call
Call Optimization Application (COA-C) co-resident with Terminal C
1004
1404
COA-C token generator
1406
Token modified
1408
SEND BACK

Figure 14

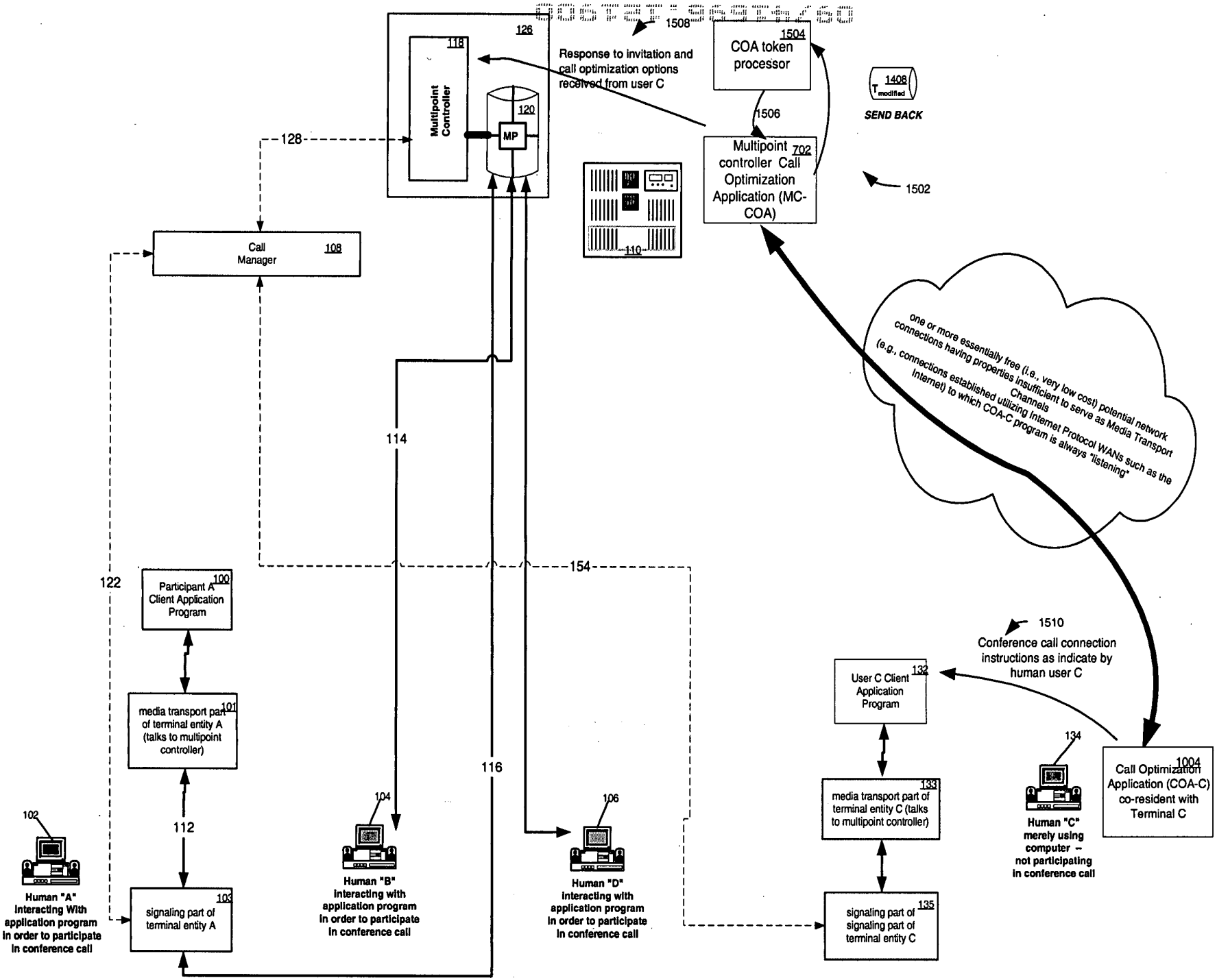
126
118
Multipoint Controller
120
MP
1508
Response to invitation and call optimization options received from user C
1504
COA token processor
1506
1408
T modified
SEND BACK
Multipoint controller Call Optimization Application (MC-COA) 702
1502
128
Call Manager 108
110
one or more essentially free (i.e., very low cost) potential network connections having properties insufficient to serve as Media Transport Channels
(e.g., connections established utilizing Internet Protocol WANs such as the Internet) to which COA-C program is always "listening"
114
154
122
Participant A 100
Client Application Program
media transport part of terminal entity A (talks to multipoint controller) 101
112
signaling part of terminal entity A 103
102
Human "A" interacting With application program in order to participate in conference call
104
Human "B" interacting with application program in order to participate in conference call
116
106
Human "D" interacting with application program in order to participate in conference call
1510
Conference call connection instructions as indicate by human user C
User C Client Application Program 132
media transport part of terminal entity C (talks to multipoint controller) 133
signaling part of signaling part of terminal entity C 135
134
Human "C" merely using computer – not participating in conference call
Call Optimization Application (COA-C) co-resident with Terminal C 1004

Figure 15

multipoint controller does one of the following in response to option selected by human user C:

(1) takes no action; or

(2) acts "as if" terminal C were joining a "meet me" conference call by directing call manager 108 to connect terminal entity calling in and authenticating itself with a particular password to a port of multipoint processor 120 associated with the ongoing conference call between terminals A, B, and D)r; or

(3) directs call manager 108 to instruct its terminal entity (not shown) to initiate a media channel to span between media transport part of terminal entity C 133 and multipoint processor 120.

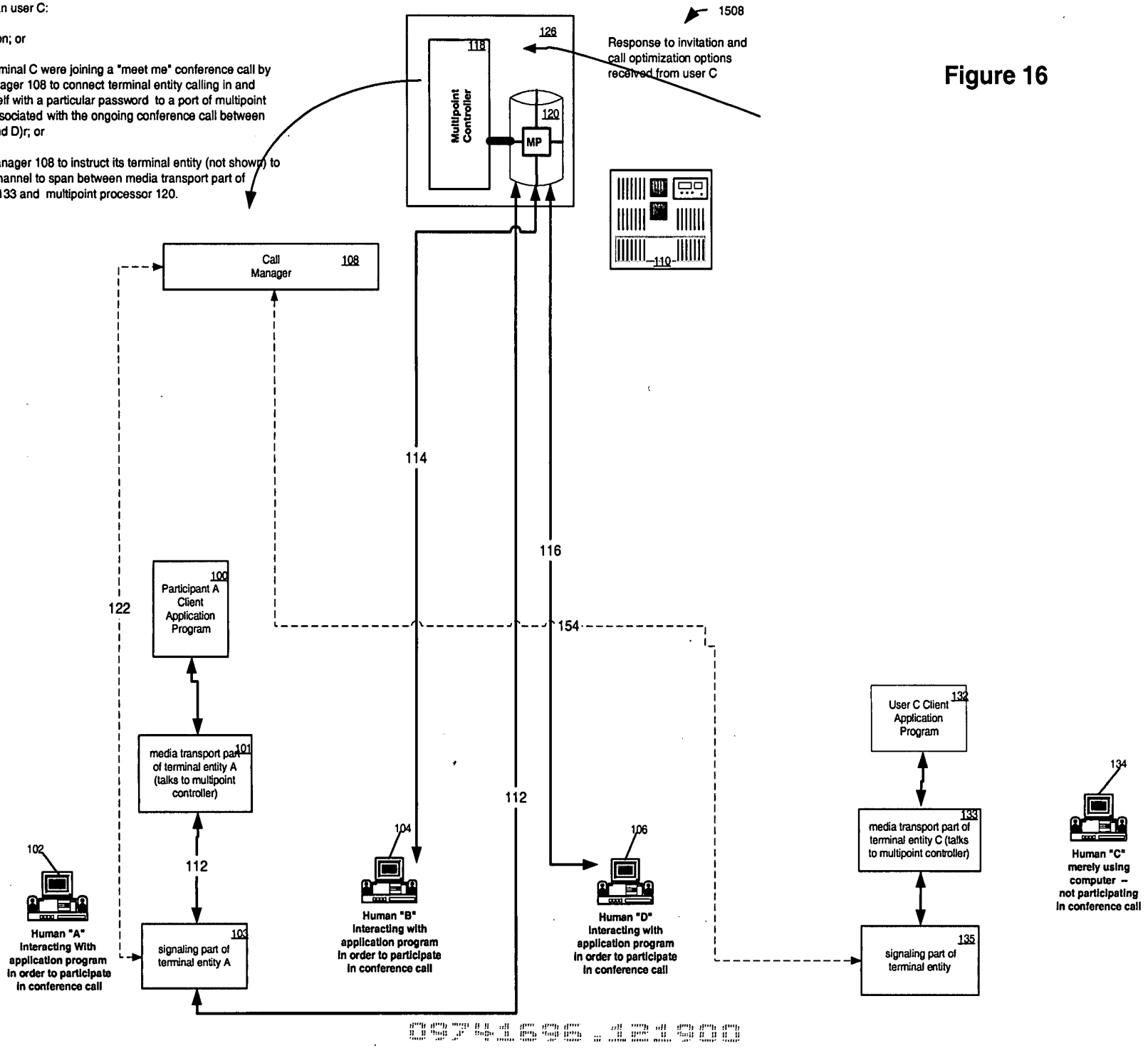


Figure 16

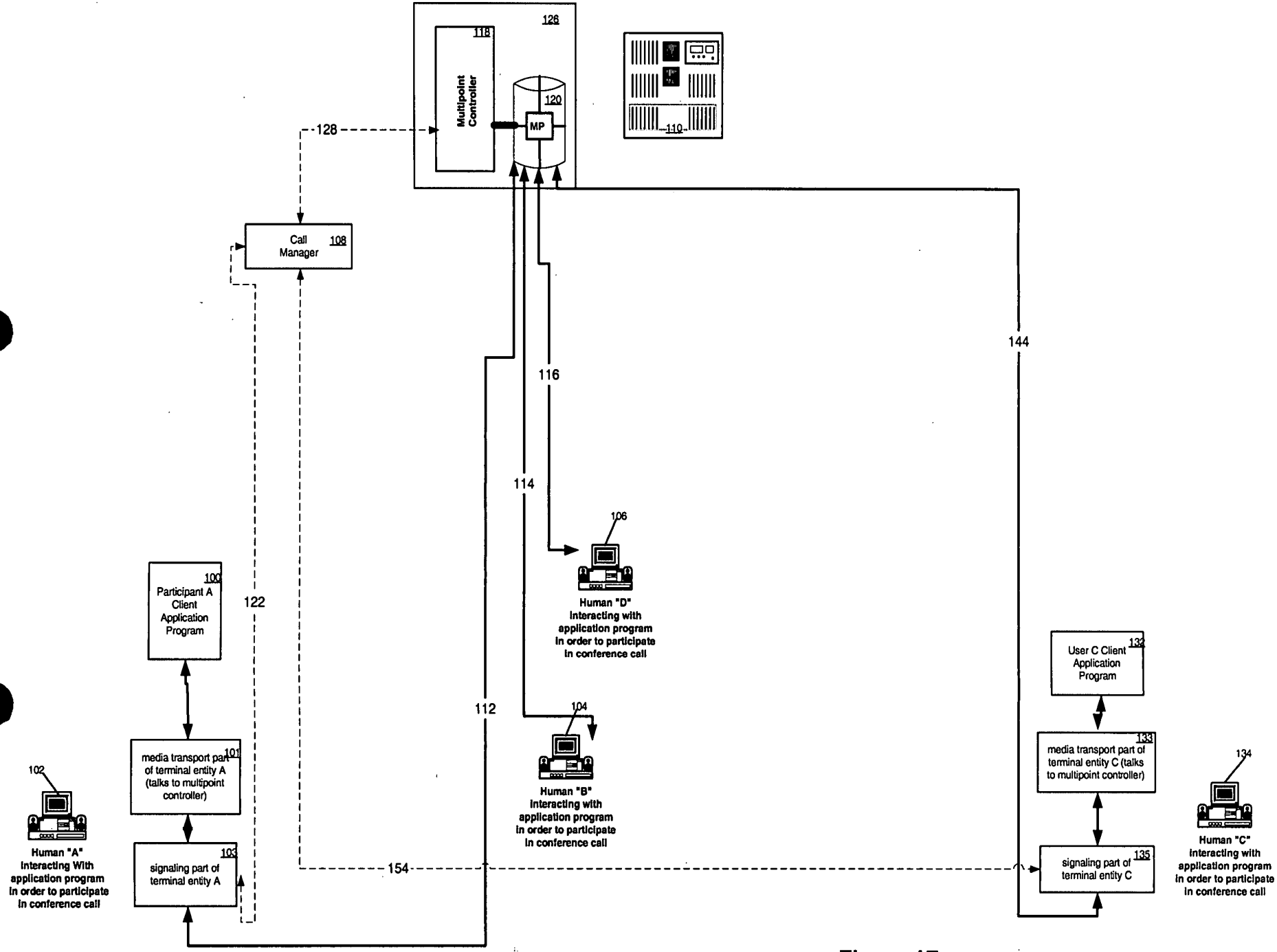
126
118
Multipoint Controller
120
MP
110
128
Call Manager
108
144
116
114
106
Human "D" Interacting with application program in order to participate in conference call
100
Participant A Client Application Program
122
User C Client Application Program
132
112
104
media transport part of terminal entity A (talks to multipoint controller)
101
media transport part of terminal entity C (talks to multipoint controller)
133
134
102
Human "B" Interacting with application program in order to participate in conference call
Human "A" Interacting With application program in order to participate in conference call
signaling part of terminal entity A
103
154
signaling part of terminal entity C
135
Human "C" Interacting with application program in order to participate in conference call

Figure 17

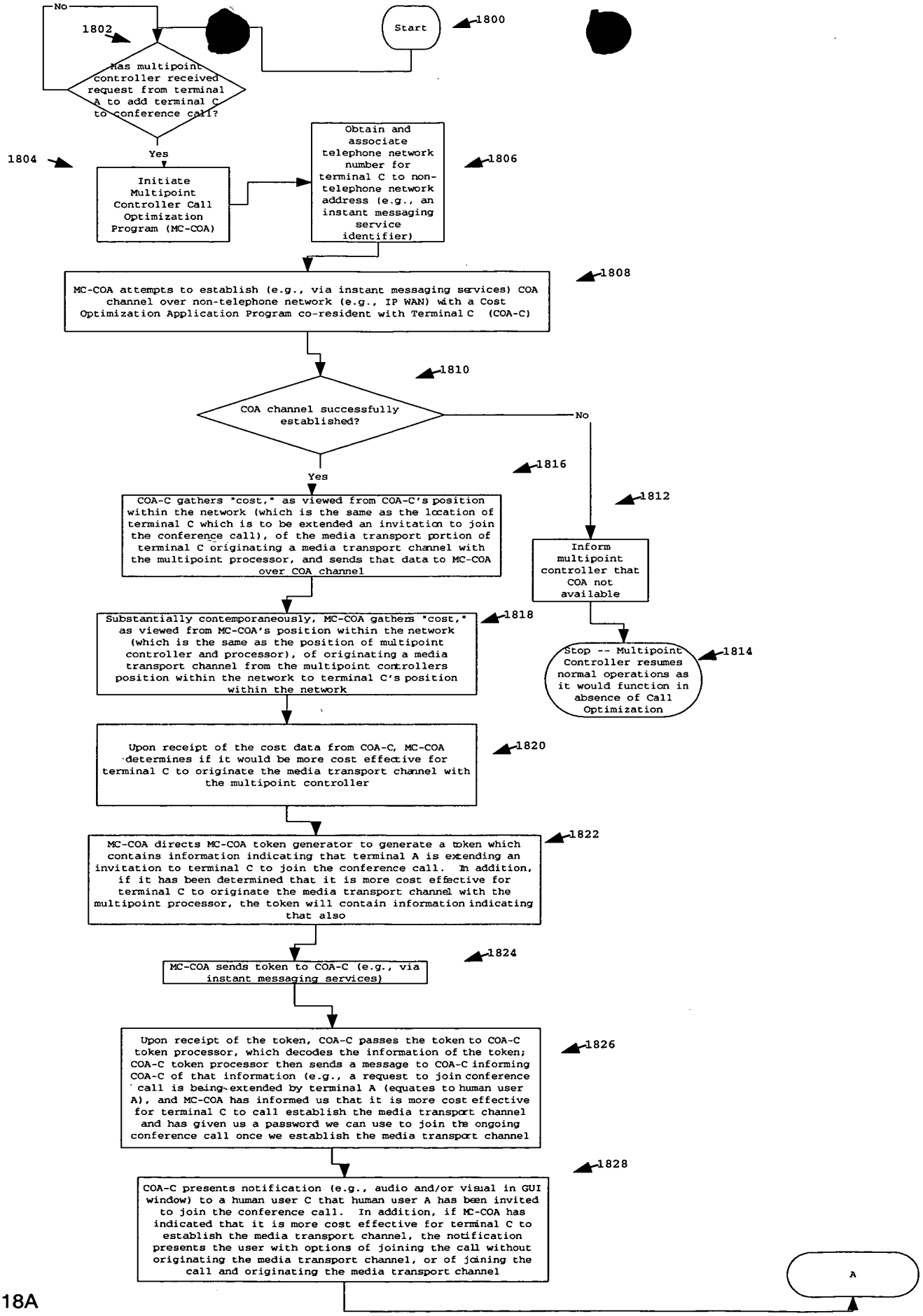
Start
1800
1802
Has multipoint controller received request from terminal A to add terminal C to conference call?
No
Yes
1804
Initiate Multipoint Controller Call Optimization Program (MC-COA)
Obtain and associate telephone network number for terminal C to non-telephone network address (e.g., an instant messaging service identifier)
1806
MC-COA attempts to establish (e.g., via instant messaging services) COA channel over non-telephone network (e.g., IP WAN) with a Cost Optimization Application Program co-resident with Terminal C (COA-C)
1808
1810
COA channel successfully established?
No
Yes
1816
1812
COA-C gathers "cost," as viewed from COA-C's position within the network (which is the same as the location of terminal C which is to be extended an invitation to join the conference call), of the media transport portion of terminal C originating a media transport channel with the multipoint processor, and sends that data to MC-COA over COA channel
Inform multipoint controller that COA not available
Substantially contemporaneously, MC-COA gathers "cost," as viewed from MC-COA's position within the network (which is the same as the position of multipoint controller and processor), of originating a media transport channel from the multipoint controllers position within the network to terminal C's position within the network
1818
Stop -- Multipoint Controller resumes normal operations as it would function in absence of Call Optimization
1814
Upon receipt of the cost data from COA-C, MC-COA determines if it would be more cost effective for terminal C to originate the media transport channel with the multipoint controller
1820
MC-COA directs MC-COA token generator to generate a token which contains information indicating that terminal A is extending an invitation to terminal C to join the conference call. In addition, if it has been determined that it is more cost effective for terminal C to originate the media transport channel with the multipoint processor, the token will contain information indicating that also
1822
MC-COA sends token to COA-C (e.g., via instant messaging services)
1824
Upon receipt of the token, COA-C passes the token to COA-C token processor, which decodes the information of the token; COA-C token processor then sends a message to COA-C informing COA-C of that information (e.g., a request to join conference call is being extended by terminal A (equates to human user A), and MC-COA has informed us that it is more cost effective for terminal C to call establish the media transport channel and has given us a password we can use to join the ongoing conference call once we establish the media transport channel
1826
COA-C presents notification (e.g., audio and/or visual in GUI window) to a human user C that human user A has been invited to join the conference call. In addition, if MC-COA has indicated that it is more cost effective for terminal C to establish the media transport channel, the notification presents the user with options of joining the call without originating the media transport channel, or of joining the call and originating the media transport channel
1828
A

Fig. 18A

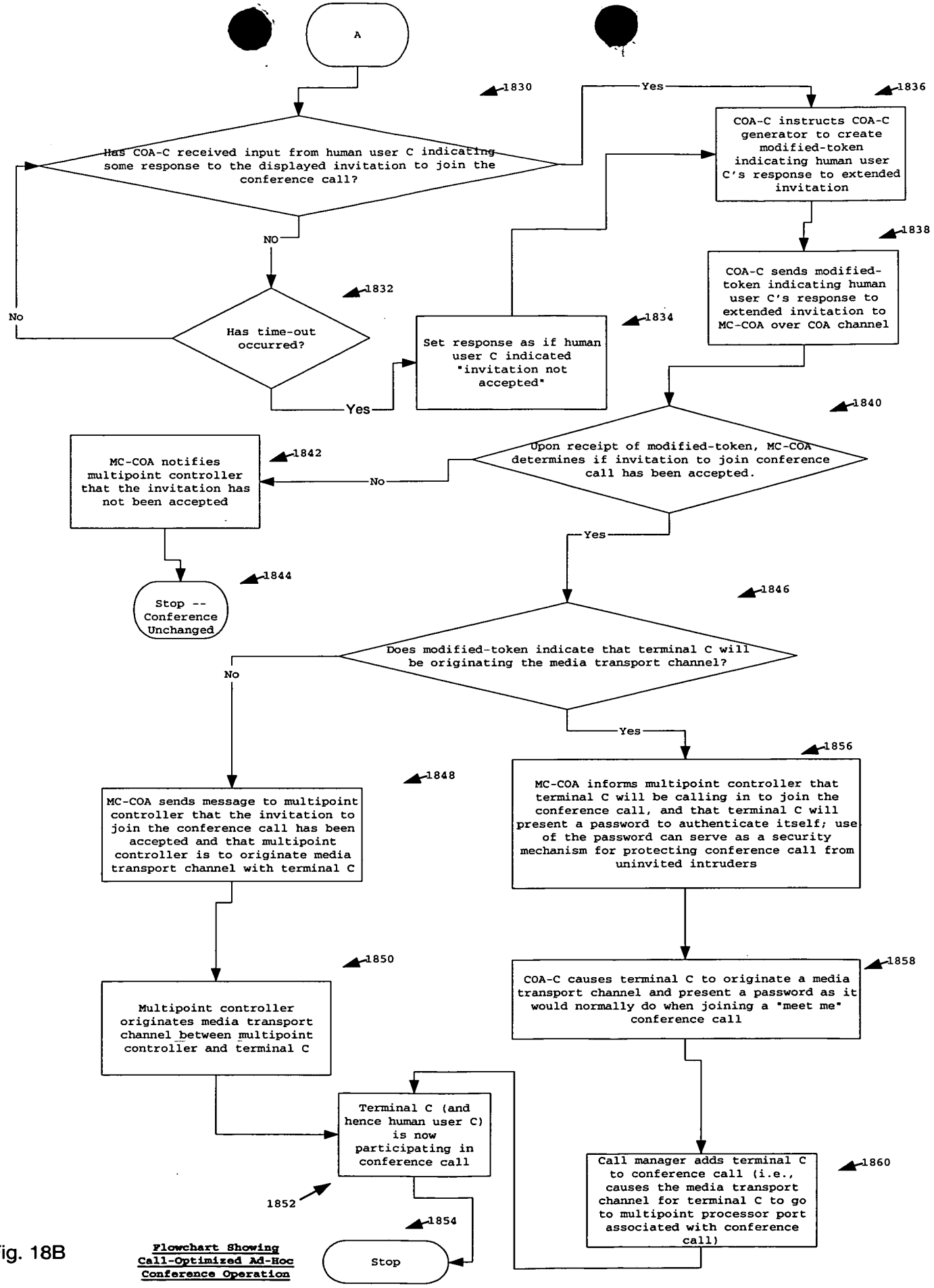


Fig. 18B

**Flowchart Showing Call-Optimized Ad-Hoc Conference Operation**